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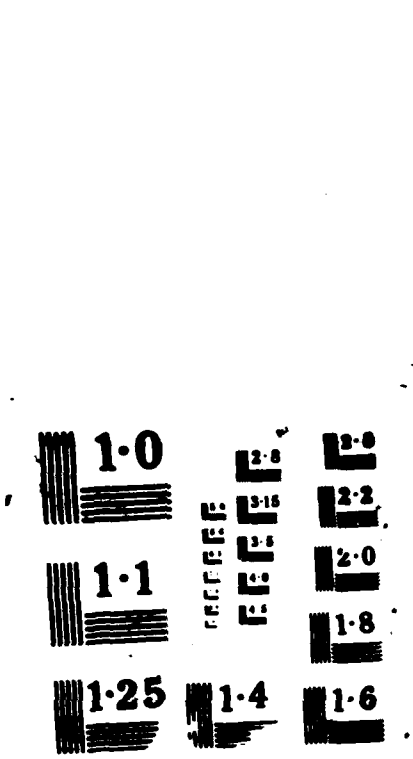
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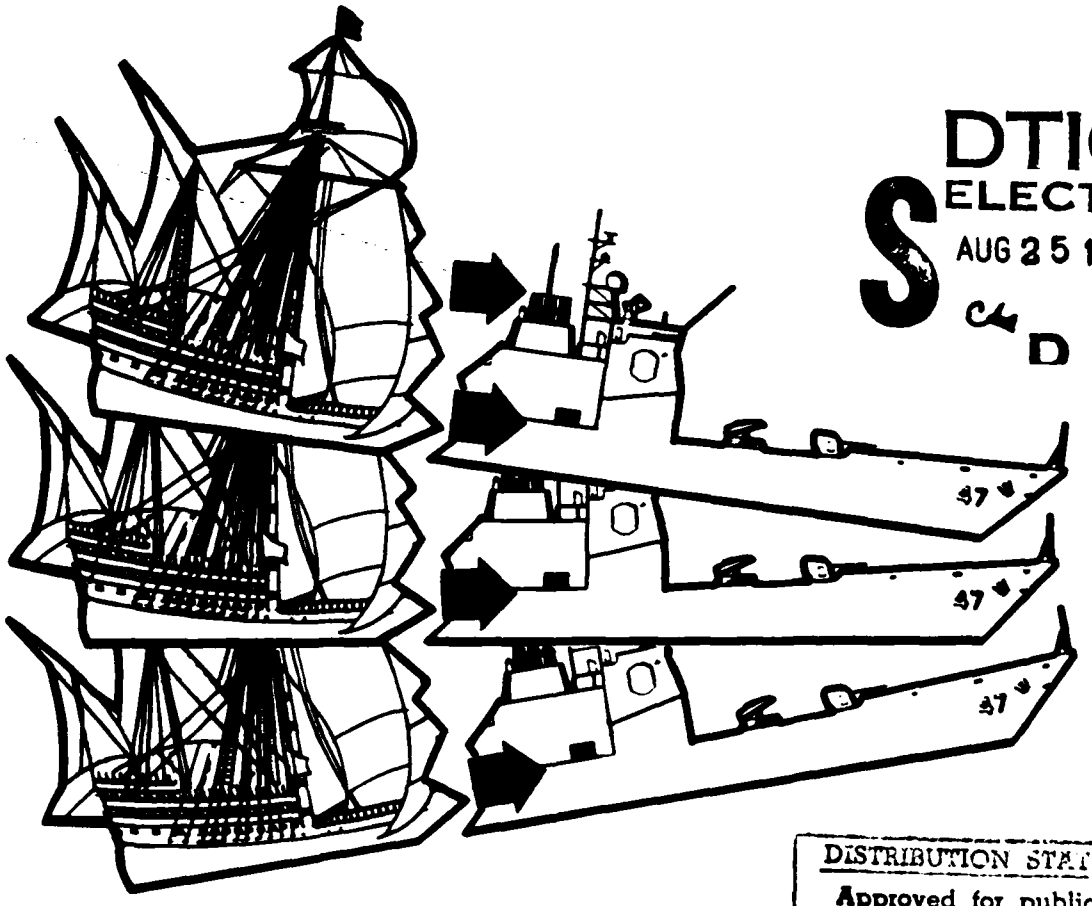

WHAT IS WIPE?

by: Jim Heller

ASSOCIATION OF SCIENTISTS AND ENGINEERS OF THE NAVAL SEA SYSTEMS COMMAND • DEPARTMENT OF THE NAVY • WASHINGTON D C 2036

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I. DEFINITION:

"WIPE" is an acronym for the words; Warfighting Improvement Plan Engineering. It is often pronounced "WIPE" or "WIPEEE" or "WIP Engineering". All of the above are acceptable. It is the objective that is important.

WIPE is a "systems engineering" approach to meeting the service life engineering requirements for a class of ships. It is managed by a Ship Design Manager and is performed at the Class planning yards (PY). Specific WIPE task statements are developed by the NAVSEA life cycle engineers who also review the WIPE deliverables when submitted by the planning yard.

WIPE is here today. There are WIPE programs in progress for the CVA's , LHA's, BB's, CGN's, CG 16/26, FFG 7, DD 963, DDG 993, and the PHM classes. These are presently being performed at the Class planning yards; specifically Norfolk, Philadelphia, Long Beach, Norfolk, Puget Sound, Long Beach, Ingall's and Boeing respectively. Many of these programs have developed their future data packages and are utilizing them today.

The term WIPE is new, the concept and the need are not. The term was first adopted last year. Prior to that SLESP, which became MODEP, which became CIPE, which became WIPE were the vogue terms used to describe basically similar programs. The words are no longer important. What remains essential is the fact that advanced, integrated engineering must be performed to maximize performance and minimize costs for modernizing the ships during their service life. All these programs sought this goal. WIPE is achieving this!

II. INTRODUCTION:

First, I will describe the total system within which the Fleet Modernization Program (FMP) functions. It is important to gain an understanding of all the program elements since ship modernization is a very complex subject. Modernization funds are always limited and time is critical since ships are removed from the front line during their availabilities. We must optimize our dollars and design effort to attain our objectives.

Next, I will explain the objectives of the WIPE program and how ther engineering fits into the entire FMP process.

Finally, I will present the FFG 7 Class WIPE program that I currently manage.

III. THE PROGRAM ELEMENTS:

PPBS: The Planning, Programming, and Budgeting System (PPBS) objective is to identify mission needs, match those needs with available resources, and then translate mission needs into budget proposals. It provides three main outputs; the Defense Guidance addressing the threat, the Five Year Defense Program (FYDP), and the DOD portion of the President's budget proposal.

This effort is primarily performed by the OPNAV sponsor but the NAVSEA Ship Logistic Manager (SLM) has an integral part in the decision process.

The planning phase develops strategy, policy, and force planning guidance after a thorough examination of the threat. This threat is promulgated to us in the Surface Warfare Plan and in the Surface Ship Combat System Master Plan (SSCSMP) Volume 1 which are both classified documents. Decisions to upgrade existing capabilities are based on the speculated threat and the new equipments required to beat the threat.

The programming phase is designed to take the essential elements of defense guidance and develop the Department of the Navy (DON) Five Year Defense Program (FYDP-pronounced "fidup") and the DON Program Objectives Memorandum (POM). Fiscal requirements (dollars) are first projected in a five year analysis, and then honed to greater detail for the upcoming two year period, called the POM. This effort establishes the Navy's "wish list" and total dollars required. It is submitted for approval at the DOD and Congressional levels. The POM is built from the bottom up, with dollars broken out and assigned to individual sponsor programs.

The Budget phase is the last action in the process. This phase seeks congressional authorization and appropriations to execute the program.

FMP: The Fleet Modernization Program (FMP) is directly affected by the POM and budget. This is a major piece of the Navy budget and it determines our fiscal ability to upgrade the ships.

The mechanics of the FMP are well defined in the two part volume by the same title, reference (a). The program encompasses all aspects of modifications authorized to existing ships and is under the direction of an OPNAV Sponsor; OP-03 for Surface Ships. It provides the total umbrella of modernization and upgrades to meet current and future requirements out to the POM years.

The changes to the ships developed in the FMP are collectivelly called Ship Alterations (SHIPALTS). These changes are typically initiated by submitting either a Proposed Military Improvement (PMI) or a Proposed Technical Improvement (PTI). The developmental process of increasing engineering detail is known

as the SAP, SAR, and finally the SID.

The Ship Alteration Proposal (SAP) is a NAVSEA developed and approved document that provides preliminary level technical and logistic guidance to the planners and PY engineers on the purpose, scope, and technical installation of the alteration. Within this effort location, design connectivity, and system impact are assessed. This document receives a full NAVSEA review, including the Combat System, Ship System, and Hull Group engineers. It also must meet the final approval of the Ship Logistic Manager (SLM). The SAP is the tasking document that is forwarded to the planning yard to develop the next higher level of engineering detail, the SAR.

The Ship Alteration Record (SAR) is developed by the PY and it provides more detail within a similar format. This document includes a more detailed engineering solution, an accurate equipment listing, and detailed sketches for installation where required. This document confirms to NAVSEA that the proposed installation is feasible and details the system modifications required. This document is again submitted to NAVSEA for review, concurrence, and formal technical approval.

The Ship Installation Drawings (SIDs) are then prepared to form the direction to the installing yard on how the alteration is to be performed. Typically, copies of this document are forwarded to NAVSEA for review only. The details from the drawing serve to verify the calculation provided in the SAR. This is the final data produced for the ship availabilities.

WIP: The Warfighting Improvement Plan (WIP) is the mechanism that OP-03 utilizes to program modernization upgrades to specific ship classes. It's primary objective is to document the CNO's modernization goals and objectives as they relate to the mission, characteristics and Top Level Requirements (TLR) of a specific class. The WIP is a management document to establish discipline and stability to the FMP for a ship class within the POM time cycle. It provides a single, integrated, stand-alone document to define the projected configurations, the characteristics of a specific ship class, and a planned time table for achievement.

This document includes an OP-095 prepared statement that addresses the threat and identifies the Class warfighting shortcomings; the existing ship configuration; a listing and description of planned alterations; recommended alteration packages; a narrative summary of ship impact; the cost for executing the approved WIP options; and a recommended schedule for implementation. Reference (b) provides additional information on this topic.

The applicable SLM, acting as executive agent within NAVSEA, prepares the WIPs for submission to the CNO SCIB (Ship Characteristics Improvement Board). The SLM uses the NAVSEA Ship Design Manager (SDM) as his technical agent with the support of

the cognizant engineering codes to develop the WIP document.

This document serves as the vehicle within the Naval Sea Systems Command (NAVSEA) for promulgation of CNO-directed FMP actions by the SLM. The WIP approves ship alterations for installation to the ship class.

WIPE: The engineering necessary to support and validate the WIP is called the WIPE. The WIPE also forms a bridge between the NAVSEA engineers and the PY engineers in regards to the integrated engineering execution of the total alteration package. It provides technical communication on the future plans for the Class and also develops a feasible approach to the installation of all the alterations.

The WIPE effort develops three distinct engineering packages to describe the various ship configurations. The Initial Class Baseline (ICB) represents the current ship configuration. The WIP Configuration or Projected Class Baseline (PCB) includes all the alterations approved by the Ship Characteristics Improvement Board (SCIB) that are planned for the next major Class overhaul. The Future Class Baseline (FCB) projects the Class with all planned alterations to meet the WIP Shortcomings, the Combat System Master Plan Baseline 2 upgrades, and the HM&E improvements.

The starting point for WIPE efforts is the formulation of the total list of all planned alterations and their engineering development. The FCB Master List of Alteration and is promulgated annually by the Ship Design Manager. Authors note: I use the new term "FCB" for Future Class Baseline in lieu of the previous PCB usage to conform with the terminology used in references (b) and (c). The list must go beyond the next availability and the alterations as approved by the WIP. It should encompass the improvements desired in the FYDP (5 years) and the Combat System Master Plan. It should go out to the extent that technical data is available. Feasibility level of detail is acceptable for the FCB. In fact it is desirable since there will be many changes before these alterations are installed.

This master list of alterations is the superset of all planned alterations. The WIP approved option, the next ship availability, and the FFG XX work package, for example, are all subsets of this list. Their engineered packages utilize the work done on the FCB to provide integration and configuration control.

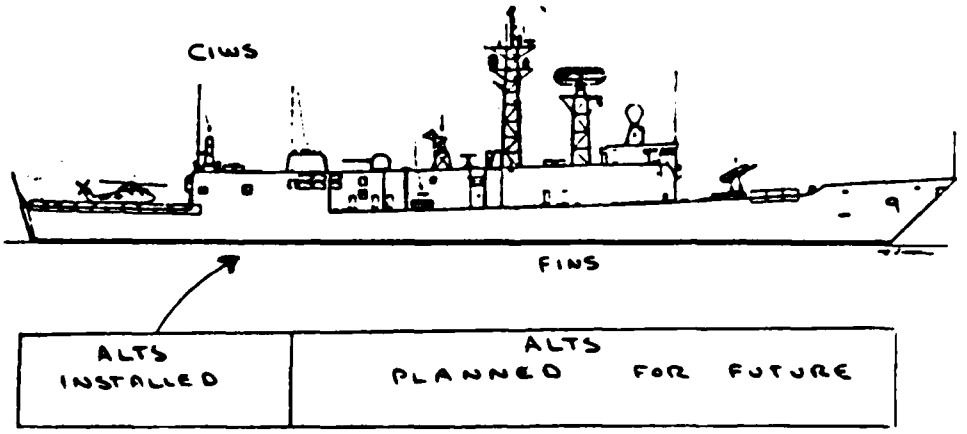
The first technical definition of a ship design for the WIPE is called the Initial Class Baseline (ICB). This design represents the current configuration of the class. All key ships systems are defined in sufficient detail to enable both NAVSEA and the PY engineers to make intelligent, informed decisions. Typically this includes arrangement booklet drawings and C&A's, one digit (summary) weight reporting, one line schematics, load analyses, and block diagrams of selected ship systems. The selected ship record drawings provide much of this data when they

are available.

A single ship of the class is chosen to represent the WIPE baselines. This provides continuity and configuration control through the effort. Minor variances among the ships in the class are handled when developing the availability packages. Major deviations may require special tasks or additional baselines.

The effort includes reviewing the total list of FCB alterations, determining which are installed on the ship, and preparing a technical design package. In many cases, the technical data for the ship may not accurately represent the current baseline. Should that be the case, the engineer must add the alterations that are on the ship but not included in the data.

At this juncture we have a technical description of the ship. The ICB represents the ship as she floats at the pier today. It defines her arrangements, displacement, vertical moment, longitudinal stresses, electrical system, HVAC system, and fluid systems for the firemain, electronic cooling, and chill water areas. The systems chosen by the SDM are a balance between dollars, deficiencies, and desires.



INITIAL CLASS BASELINE
figure 1

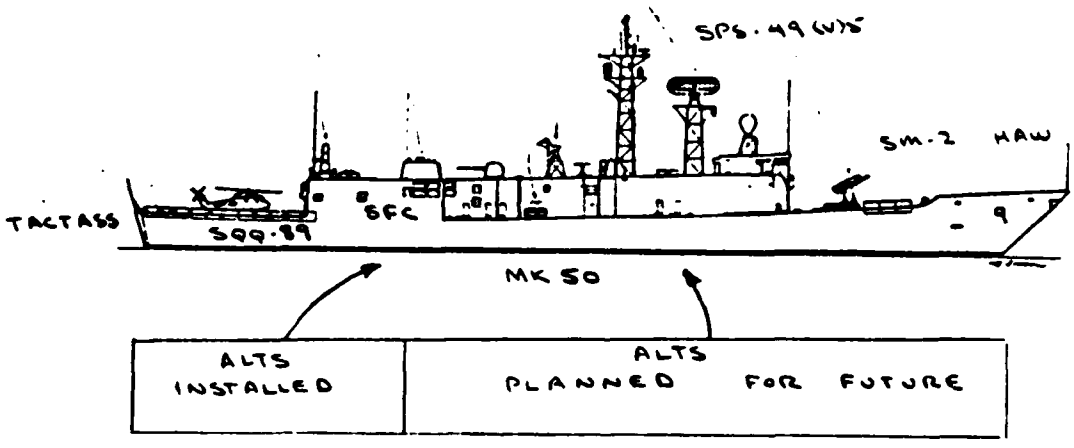
The ICB is a waypoint. It typically will not be updated. It provides a measure for validation of many systems. The ICB's primary purpose is to provide the baseline for the remaining FCB Alts. It's usefulness, for WIPE purposes, ends at its completion.

The second phase of this effort is the building of the FCB

design. This design incorporates all planned alterations not already included in the ICB. The integration comes from the fact that the PY system's engineer is designing the entire package of alterations at the same time. Only through an integrated approach where the total package is understood can proper optimization be achieved. This is similar to new ship design integration where all systems and equipments are identified and designed concurrently as a total ship system.

Parallel to the PY effort is the Combat Systems Engineer's effort to develop the future combat system design that incorporates the SSCSMP and the WIP alterations. This is integrated with the FCB design.

The end result is a design that confirms the feasibility of executing the POM. It also assures the feasibility of the WIP option designs that can be presented to the SCIB for approval.



FUTURE CLASS BASELINE
figure 2

The WIP Configuration or PCB is now developed to incorporate the next availability alterations into the design package. The FCB effort provides valuable configuration and technical data to assist the PY engineers in developing the SAR's and SID's that will direct the changes to the ships. Feasibility studies will also be prepared by NAVSEA for the WIP configurations to assure technical correctness and accurately determine the impacts and costs.

IV. Detailed Process for the FFG 7 Class:

I would now like to discuss the WIPE process for the FFG 7 Class. The FFG 7 Class is broken into two major configurations for WIPE purposes with two FCB's planned. For the WIPE study I

have designated FCB I as the LAMPS I baseline using the FFG 9 as the representative hull, and FCB III for LAMPS III using the FFG 45. These hulls were chosen due to their proximity to the planning yard and the availability of selected record drawings.

The first step is the list formulation and engineering development of the FCB alterations. This list includes the alterations in the approved WIP Option, the Combat System Master Plan and the alterations planned for the future wherever engineeering data can be provided. The goal is to develop a feasibility study to represent the ship class in the "plus ten" year time frame.

The list includes the SSS (Surface Ship Survivability) alts, the communciations upgrades, ASW upgrades, and the AAW upgrades like CDS, SM-2, and the UYK-43 computers. It also includes the HM&E improvements that are identified for the Class. Table 1 is the list of the 1987 FCB alterations.

The initial ICB I design effort is being performed by LBNSY. This data represents the FFG 9 as she sits at the mole piers in Long Beach Naval Station.

The FFG 9 documentation at the start was primarily based on her as-delivered condition. LBNSY engineers had to identify the FCB alterations that have already been installed on the FFG 9 like FINS, Crew MODs, SNAP II, etc. and include their impact to the FFG 9's technical data. The ICB I represents the drawings and data updated for the FFG 9 present configuration. LBNSY engineers can visit the ship, confirm the configuration, review electrical power log figures, and so forth to validate their ICB I design wherever warranted.

Next the FCB is developed using the ICB design as the baseline by adding the remaining alterations from the FCB list. Several standard WIPE tasks have been developed. These will be better defined in a future WIPE technical specification. I have included summaries of the FFG 7 WIPE tasks here.

- The general arrangement task revises the arrangement booklets and the C&A drawings. These reflect major configuration changes like bulkhead relocations, access changes, and the room redesignations.

- The habitability task investigates impacts to the habitability areas. It pursues changes to improve living conditions onboard the ships by expanding the number of seats on the mess decks, increasing the amount of potable water stowage, and reviewing possible locations for a notional addition of two officers, two chief petty officers, and four enlisted crew members.

- The manning task investigates the impact of the planned alterations on the ship's manning document. This is a technical approach that reviews the watch assignments and assesses the

maintenance work load changes of the new equipment. The result is a recommended manning allowance similar to the PSMD (Preliminary Ship Manpower Document) that is produced by NAVSEA for new ship designs.

- The weight and moment task for the FFG 7 Class have special importance since this is a status II (weight and moment critical) Class. The weight and moment impact of each ship alteration is calculated at the SAP or prior period and tabulated by alteration. The sum total with compensating ballast if required is included into the FCB design. We also identify weight and moment reducing candidates to provide a shopping list of corrective actions should they be required to execute the planned upgrades. By determining the FCB displacement and KG we are able to assess where we are headed in these critical areas. We also identify and develop the removal candidates required to execute the plan.

The weights of the alteration are also distributed across a 20 station weight curve to provide information on the longitudinal stresses of the FCB design.

- The heating and ventilation system impact is reviewed by alteration to ensure that sufficient HVAC services are available for each space to meet equipment and personnel requirements.

- The electrical task develops the 60 and 400Hz one line schematics and load analyses. This ensures sufficient capacity to serve the various loading conditions and proper balance between the switchboards and distribution centers.

- The fluids task addresses three system components; the firemain, the electronic cooling system, and the chill water. The firemain effort includes a system load analysis of pressure and flows to all planned equipment to ensure we can meet the seawater cooling and safety requirements imposed for this system. The electronic cooling system defines the new system impact on the existing heat exchangers. The chill water analysis determines the ability of the three 80 ton A/C compressor units to meet the expected chill water load of the FCB configuration. The optimum distribution, measured both in tonnage and flow, is also determined.

- The combat system task at the PY includes an arrangement study to ensure the planned additional equipments can be installed into the assigned spaces. The subsequent SARs and SIDs developed to install these equipments will utilize the FCB plan to install them. This way we ensure that all equipments will fit in mutually exclusive locations to minimize the possibility of ripout and reinstallation.

- In future years additional tasks may be developed to deal with other systems requiring detailed investigation.

The final FCB is reviewed by the NAVSEA engineers. Design

review will be held to discuss various aspects of the design for clarification, improvement, or alternative methods. The finished product will be approved as a planning tool for future design work.

The FCB designs will be used by the PY and NAVSEA engineers in reviewing all future alterations. It provides guidance in the development of specific availabilities PCB's (Projected Class Baselines). It also supports the engineering of individual hull availabilities. The Combat System Engineer will also use this to ensure his future combat system will fit and operate in the class.

The follow-year efforts will include updating the FCB designs to a revised list of FCB alterations issued by the SDM. Technical changes that have been identified through the SAP, SAR, SID development process will be reviewed by the EPY engineers to verify the decisions made on the FCB. Additional alterations needed to meet changing threats or support requirements will also be included in the annually updated FCB.

V. Conclusions:

I have painted a very pretty picture about how things "can" be. This is a ship design manager's prerogative. However the WIPE does not get done overnight. It requires active financial and technical support and a lot of faith. The planning yard engineers assigned to WIPE tasks also support the waterfront, SAR/SID packages, and fire drills. The NAVSEA engineers must devote extra effort to supervise the tasks and control the product.

WIPE depends greatly on data that must be provided very early in system development. Engineers must make engineering judgements to a feasibility level of detail in the design effort. The design is updated annually to the best information available. It is a planning tool. We must make estimates and continue to update them throughout the process. "Any number is better than a zero!"

NAVSEA is presently seeing the payback of the WIPE effort. The CG 16/26 FCB development has greatly aided the engineers in performing the NTU integration and conversion of the USS BELKNAP to a Fleet Flag ship. New alterations for these ships are being integrated to the future class baseline, not the specific current ship configurations.

The purpose of this paper is to communicate what we are achieving for WIPE. Beyond communicating the program, there are also many improvements that should be considered for the WIP/WIPE process. The WIPE program is new and dynamic and can benefit from your inputs. Thank You!

TABLE 1. LISTING OF FCB ALTERATIONS FOR FFG 7 CLASS

FIN STABILIZERS
TACTASS
RAST
CIWS
LAMPS MK III
LINK II
COMM SECURITY SYSTEM
SINGLE AUDIO SYSTEM
SATNAV
ANTENNA COUPLER
UHF DAMA
OTCIXS
SPS-49 RVP/ADT
CHT BLOCK 2
TSEC/KW 46
SLQ-20 SEESAW
EMI FIX
HP AIR START
STERN TUBE SEAL
SQQ-88 QMS
HALON UPGRADE
GUN/TORPEDO MAG UPGRADE
HELO DOOR SEAL
HELO DOOR MOTOR
WT CARGO DOORS
FLUSH DECK HATCH
SNAP II
HELO SAFETY NET IMPR
CENTRAL DRY AIR
BOAT BOOM REMOVAL
BERTHING MODS
GT UPTAKE MODS
INTAKE DUCT MODS
ADD VENT ACESS
SS CRACK FIX
INCREASED DISH TEMP
SFC CONVERSION
4100 TON UPGRADE
AFFF
TASK LIGHTS RELOC
ESP REMOVAL
SOMAT PULPER
HANGAR WINDOW
REMOTE VALV FO PURF
GMLS WINDOW
KG-84C CRYPTO
SLQ-32 BAND 1 ENHANCE
TSEC/KY-58 CRYPTO
BOAT CLEAT
SSDG ROTOR
DEHYR LP AIR
NIXIE CUTOUT
A/C DAMPERS
SSDG CONT CABLES
SQQ-89 OBT
MK 50 TORP
PENGUIN
A/C ZINCS
MK 92 CORT
SM-2 HAW
SYS-2 IADT
CDS
CIWS BLOCK 2
HARPOON 1C
ARR-75/ANDVT
UYQ-25 SIMAS
SKR-4A
SPS-49(V)5
USQ-83 FLTBRCST
OMEGA
GPS
UYK-43 COMPUTERS
SQQ-28 LAMPS I/III
LFAA SONAR
ASTERN REFUEL
ADDITIONAL OBAS
A/C UPGRADE
CIWS FIRE ZONE
RELOC HELO FUELING
RIB/SLAD
MAG WET TO DRY
MSG PROCESS
LWCA
STBD HELO MOD
SW ORIFICES
FWD VERTREP LTS
NOMEX FALSE DECKS
105 HOUR PACKUP KIT
UPG MED SPACES
ELECT TOOL ISSUE RM
HALON SYS MODS
DATA RECORD BQH-7A
SLQ-49 DEOY
PHASED ARRAY RADAR
THIRD P-250 PUMP

LIST OF REFERENCES

A. Fleet Modernization Program Management and Operations Manual, NAVSEA S1720-AA-MAN-010

B. WIP Technical Specification, NAVSEA 9090-900 of 26 AUG 1986

C. OPNAVINST 9010., WIP Development (DRAFT)

D. WIPE Technical Specification, (DRAFT)

E. SECNAVINST 5000.16E of 31 MAR 1986, Department of NAVY Planning, Programming, and Budgeting System (PPBS)

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